DIRECT TESTIMONY

OF

STEVEN J. CONNOR

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

DOCKET NO. 2008-196-E

Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Steven J. Connor. My business address is 900 Trail Ridge Road, Aiken, South Carolina, 29803.

Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A. I am employed by Tetra Tech NUS, Inc. (Tetra Tech). I am employed as a Project Manager.

Q. PLEASE BRIEFLY DESCRIBE YOUR EDUCATIONAL BACKGROUND, PROFESSIONAL ASSOCIATIONS, AND BUSINESS EXPERIENCE.

A. I received my bachelor's and master's degrees in physics from the Georgia Institute of Technology in 1973 and 1974, respectively. I have 34 years of professional experience in scientific, engineering, management, and educational disciplines. In my current position as Project Manager I am

responsible for managing selected projects for Tetra Tech NUS in the Aiken office, which has about 30 employees.

As a technical consultant, I also provide government, industrial, and utility clients with services in environmental radiation protection and environmental management. I have specialized skills in radiological transportation risk assessments, National Environmental Policy Act (NEPA) documentation, human health risk assessments, radiological emergency response training, induced current analysis for electrical transmission lines, and radiological support of Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response Compensation and Liability Act (CERCLA, or "Superfund") activities. My experience includes 18 years of environmental consulting for the Department of Energy and other government, utility, and industrial clients; eight years of commercial nuclear power chemistry and health physics; and five years of design engineering, research and development, construction, and project management for the alternative energy industry.

I was project manager for the preparation of the Environmental Report (ER) for the South Carolina Electric & Gas Company (SCE&G or Company) application for a combined operating license for two new nuclear plants proposed for construction in South Carolina at the site of the V.C. Summer Nuclear Station. I directed a multi-disciplinary team of environmental experts in identifying the affected environment and anticipated impacts, alternatives,

and compliance with environmental protection laws and regulations. I am also responsible for assisting SCE&G with responding to questions from the U.S. Nuclear Regulatory Commission (NRC) and other federal, state, and local agencies regarding environmental aspects of the proposed project. I am also the project manager for preparing an environmental report for a combined license for two new nuclear plants proposed for construction in Victoria County, Texas. The report will describe the proposed action, the environment that would be affected, the anticipated environmental impacts, alternatives, and the status of compliance with environmental protection laws and regulations. I am responsible for securing necessary technical expertise, directing analyses as required by NRC regulations, and preparing the report for submittal to the NRC. In accordance with NRC guidance, the environmental report will provide input in conformance with regulations of the President's Council on Environmental Quality (CEQ) implementing the National Environmental Policy Act (NEPA). The Texas project will be one of the first applications for a domestic nuclear plant on a wholly greenfield site in more than 30 years.

I previously served as the Project Manager for the preparation of an environmental impact statement (EIS) on high-level radioactive waste management at the Idaho National Engineering and Environmental Laboratory (INEEL). This EIS examined the environmental consequences of treating high-level radioactive waste. The EIS also evaluated the disposition of the existing and proposed high-level waste facilities, including those designed for

low-level radioactive waste fraction disposal. The Idaho High-Level Waste and Facilities Disposition EIS won national and international awards from the Society for Technical Communication. I also managed the development of a spent nuclear fuel programmatic EIS at the INEEL, receiving a certificate of appreciation from the U.S. Department of Energy (DOE) for that effort.

I led a diverse team of environmental scientists assisting the DOE Savannah River Operations Office (DOE-SR) in the closure of the first high-level waste tanks to be closed within the DOE complex. My activities included devising the regulatory strategy, writing a general closure plan covering all 51 tanks, writing tank-specific closure models, modeling the impacts from various closure scenarios such as waste removal regimes and residual waste stabilization techniques, and writing a comprehensive document establishing DOE-SR's regulatory position that the waste residual is not subject to Nuclear Regulatory Commission licensing as high-level waste. This groundbreaking work received praise from DOE and is expected to form the basis for tank closures at other DOE sites.

I also have significant experience in nuclear plant license renewal. I have served as the project manager for NRC license renewals at three different nuclear plants and provided technical support for the license renewal for the V.C. Summer Nuclear Station in 2002. These duties involved collecting data on environmental characteristics and plant systems, analyzing the impacts of license renewal on the environment and the local economy, and preparing an

environmental report used by the Nuclear Regulatory Commission in its license renewal decision.

In my prior position as manager of the Environmental Radiation Department at then Halliburton NUS, I provided environmental radiation protection and environmental management support to the DOE, the U.S. Department of Defense, the U.S. Environmental Protection Agency (EPA), and industrial and utility clients. My departmental activities included radiological transportation risk assessments and field assessments of environmental radiation protection activities against Federal and state regulations and industry standards; human health and ecological risk assessments in support of U.S. Nuclear Regulatory Commission, RCRA, CERCLA, and NEPA requirements; environmental radiation protection programs such as environmental monitoring plans and "as low as reasonably achievable" (ALARA) programs; and regulatory impact analyses.

As an environmental health physicist, I performed dose and risk assessments in support of client regulatory needs and provided technical support for radiological risk assessments at several RCRA/CERCLA disposal sites. I also performed technical reviews of program plans, QA plans, compliance plans, procedures, design documents such as conceptual design reviews and safety analysis reports, environmental reports, NEPA documents, RCRA Facility Investigations and CERCLA Remedial Investigations Work Plans, CERCLA baseline risk assessments, and similar documents at the

Savannah River Site. These reviews required a broad technical knowledge base, including familiarity with DOE Orders, EPA regulations, DOE and EPA technical guidance, national consensus standards, nuclear physics, health physics, chemistry, and mathematics.

I have attached my curriculum vitae as **Exhibit No.__ (SJC-1)**.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to discuss and offer expert opinions regarding the environmental impacts of the construction and operation of two nuclear units at the existing V.C. Summer Nuclear Station site near Jenkinsville in Fairfield County, South Carolina (Facility). I will discuss and explain, where necessary, the Environmental Report (ER), which was prepared as a required element of the Combined Operating License (COL) Application (COLA) filed by SCE&G with the NRC. The ER constitutes a comprehensive environmental assessment and analysis of the environmental impacts of the Facility. It discusses in detail the environmental permitting necessary for the construction and operation of the Facility. With permits come compliance obligations. These are discussed as well. Also, an important element of the overall environmental evaluation of the Facility is an analysis of proposed alternatives to the Facility. Therefore, the ER also contains this alternatives analysis.

Q. WHAT IS THE FACILITY?

A. The Facility consists of two nuclear plants, Units 2 and 3, which together will produce approximately 2,234 megawatts of power. The Facility will be co-located with an operating nuclear plant, Unit 1, at SCE&G's V.C. Summer Nuclear Station near Jenkinsville. Detailed information about the site and the Facility are available in the ER.

Q. WHAT IS YOUR ROLE REGARDING THE PROPOSED FACILITY?

A. I provided technical assistance and environmental analysis for the Facility. From an overall environmental perspective (non-radiological and radiological together), the Facility is primarily regulated at the federal level by the U.S. Nuclear Regulatory Commission (NRC) and on the state level primarily by the S.C. Department of Health and Environmental Control (DHEC). NRC requires a comprehensive environmental report as part of its licensing process. My role was to manage, supervise, and assist in the preparation of the ER. I served as the project manager for analyzing environmental components of this project and compiling that analysis into the ER. I provide continuing technical assistance and support for the review of the ER as well as other environmental matters that may benefit from my knowledge and experience. This requires interfacing with NRC, DHEC, and other regulatory, environmental, and natural resources agencies when necessary.

Q. ARE YOU OFFERING INTO EVIDENCE ANY TECHNICAL DOCUMENTS IN CONNECTION WITH YOUR TESTIMONY?

A. Yes. A summary of the ER was attached as Exhibit P to the Combined Application filed with the Commission in this docket, and is also attached to my testimony as **Exhibit P (Exhibit No. ___ (SJC-2))**. The ER, attached to my testimony as **Exhibit No.__ (SJC-3)**, contains a comprehensive review of the environmental impacts from the construction and operation of the Facility as well as the environmental impacts of alternatives considered for the Facility.

Q. WAS THE ENVIRONMENTAL REPORT PREPARED UNDER YOUR DIRECTION AND SUPERVISION?

A. Yes. Tetra Tech NUS was selected to assist in the evaluation of environmental impacts from the construction and operation of the Facility as well as the development and creation of the Environmental Report. In conjunction with personnel from SCE&G and Bechtel, I directed and supervised a team of Tetra Tech subject matter experts in the research, development, and compilation of materials for significant portions of the Environmental Report. Development of portions of the Environmental Report input, such as the cultural resources investigation and report, were subcontracted by me to other subject experts. I retained overall responsibility

for the work and output from these subcontractors. They developed reports that my team and I reviewed in concert with SCE&G.

There were approximately 25 people involved in the development of the ER. I understand that over 9,100 hours were expended by Bechtel personnel. Tetra Tech personnel expended over 16,215 hours on the ER and subcontractors spent approximately an additional 2,120 hours. This time was devoted to thorough evaluation and research of the environmental issues and to the development of the ER. We initiated the environmental assessment process in January 2006 and continued until the Environmental Report was completed in March 2008.

I reviewed the sections of the ER prepared by Bechtel and its other subcontractors for substantive content before incorporating their content into the Environmental Report. The information and materials that support the contents of the ER are information and materials routinely and customarily relied upon by experts in the field. Reliance on this information and materials conforms to the practice of other environmental professionals.

Q. WILL THE CONSTRUCTION OF THE FACILITY RESULT IN ENVIRONMENTAL IMPACTS?

A. The construction of the Facility will have certain environmental impacts, as would be typical of any construction project of this magnitude.

However, the overall impacts of the construction on the natural environment will be small.

Q. HOW DO YOU DEFINE IMPACTS FOR THE ANALYSIS?

A. Because the Environmental Report was prepared in conjunction with the COLA for NRC, it tracks the format and content requirements found in the NRC's regulations at 10 C.F.R. Part 51. Using NRC terminology and categories from other NEPA-oriented environmental assessments of nuclear facilities, impacts are analyzed and defined on a significance level of small, moderate, or large. These are defined as follows:

SMALL	Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
MODERATE	Environmental effects are sufficient to alter noticeably, but not to destabilize, any important attribute of the resource.
LARGE	Environmental effects are clearly noticeable and are sufficient to destabilize any important attributes of the resource.

I use those terms similarly in describing the environmental impacts of the Facility.

Q. PLEASE DESCRIBE IN GENERAL TERMS THE PRECONSTRUCTION AND CONSTRUCTION ACTIVITIES RELATED TO THE FACILITY.

A. Among other project preparatory actions, the preconstruction activities will include activities such as site exploration, site clearing and grading, the installation of stormwater and erosion control devices, erection of fences and access control measures, excavation, erection of support building such as workshops, and the installation of infrastructure like additional utility lines. These activities are described in the Environmental Report in Sections 1.2.2 and 3.9.1. Site exploration activities already have begun and were essential to secure sufficient data to prepare the COLA. Most preconstruction work, however, will take place by 2011.

Construction activities involve the actual construction of the nuclear plant and associated facilities, such as supporting infrastructure. This includes, for example, the construction of the reactor containment structure, turbine building, and electrical substation. These construction activities and the associated environmental effects are described in the Environmental Report in Sections 3.9.2 and 4. Construction is scheduled to begin upon issuance of the COL which is expected in mid-2011.

Q. WHAT ENVIRONMENTAL PERMITS OR APPROVALS WILL BE REQUIRED TO CONSTRUCT THE FACILITY?

A. SCE&G will be required to acquire permits and approvals from federal and state agencies that review the environmental effects of the Facility's construction and operation. A listing of approvals, permits, and authorizations required for preconstruction and construction activity can be found in Tables 1.2-2 and 1.2-3 of the Environmental Report.

SCE&G will need to secure some approvals from federal agencies before and during the construction of the Facility. For instance, the NRC reviews environmental impacts as part of its licensing process, although it does allow preconstruction work to proceed prior to the issuance of the COL, subject of course to such other regulatory approvals that activity may require. The Federal Energy Regulatory Commission (FERC), as licensing authority for the Parr/Monticello Hydroelectric Project, requires that SCE&G secure its approval before construction of intake and discharge structures within the Project associated with withdrawing water for cooling, drinking, and other Facility uses. A permit to fill a small amount of wetlands, commonly known as a "404 permit," is needed from the U.S. Army Corps of Engineers (COE).

Aside from the certificate of environmental compatibility that SCE&G is seeking from the Commission in this proceeding, SCE&G must secure several permits and approvals from certain South Carolina state agencies. For example, SCE&G must acquire approval from DHEC's Bureau of Air Quality for emergency generators and equipment on the construction site, as well as approval for the construction and operation of a concrete batch plant. From

DHEC's Bureau of Water Quality, SCE&G will seek a Section 401 Water Quality Certification related to the 404 permit, stormwater permits for land disturbance activities, a navigable waters permit, a discharge permit for the construction of water and wastewater facilities, and a permit for the concrete batch plant operation.

SCE&G may also need to obtain a construction and demolition waste disposal permit should it opt for on-site disposal of solid waste such as construction debris. Alternatively, SCE&G may send the construction debris to an existing, offsite landfill.

Many of the federal standards, such as the requirements of the Clean Air Act and Clean Water Act, are administered by DHEC and have become state requirements. EPA has "delegated" that authority to the State. For example, when SCE&G applies for and receives an industrial wastewater discharge permit from DHEC's Bureau of Water Quality, that permit satisfies both the federal requirements under the Clean Water Act and state requirements under the South Carolina Pollution Control Act.

Q. PLEASE DESCRIBE THE PERMITTED CONSTRUCTION ACTIVITIES AND THE ASSOCIATED ENVIRONMENTAL IMPACTS.

A. Certainly. I will do so according to the permitting medium; in other words, air, water, and land. Within those media, one focuses on impacts to aquatic and terrestrial ecology and people.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON AIR QUALITY.

A. Air emissions from construction activities will result from the construction and operation of an on-site concrete batch plant, the operations of portable generators or similar equipment, and the operation of construction equipment generally. SCE&G will need to obtain a permit for the construction and operation of a concrete batch plant operation. On the other hand, the on-site mixing of concrete to be used for construction greatly reduces emissions associated with transportation of concrete.

Additionally, fugitive air emissions, such as dust from dirt roads or from loading dirt in a truck, will be addressed through the implementation of "best management practices" during the construction process. A dust control plan and mitigation measures will be developed before construction and implemented during the construction phase. That plan will require measures to mitigate fugitive emissions from the construction process. These may include such simple yet effective measures as covering trucks, minimizing double

handling of material, regular roadway and site watering, and re-vegetation of disturbed areas.

The expected air emissions during the construction stage are both temporary and minor. Air quality considerations associated with the construction of the Facility are addressed in Section 4.4.1.3 of the Environmental Report.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON WATER QUALITY.

A. Construction activities also will necessitate stormwater permits to cover activities in the construction process expected to result in land disturbance. Obtaining these stormwater permits from DHEC requires that SCE&G develop stormwater pollution prevention plans. These plans, which must be approved by DHEC, will embody "best management practices." Among other things, these stormwater permits will require that the water quality standards of the receiving streams continue to be met, ensuring that the water quality in the receiving water body will not be impaired. All water quality impacts are expected to be small.

Water quality impacts are discussed further in Sections 4.2 and 4.3 of the Environmental Report.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON WETLANDS.

A. The impact on wetlands and associated water quality impacts are expected to be minimal during the construction phase. A small area of wetlands – less than one (1) acre – will need to be filled. A permit to fill that area will be acquired from the U.S. Army Corps of Engineers because more than 300 linear feet of stream will be impacted. SCE&G will provide mitigation for filling the wetland area, as required by the Corps. Before the 404 permit for wetlands can be issued, DHEC will need to have issued a certification that the filling of the wetland will not adversely impact water quality. Sections 2.2, 2.4, and 4.3 of the ER address wetlands.

Q. PLEASE DESCRIBE THE PROBABLE ENVIRONMENTAL IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON WATER QUANTITY OR WATER USE.

A. Initially, and likely for most of the construction period for Unit 2 of the Facility, water will be supplied by the Jenkinsville water system. Water may be drawn from the Monticello Reservoir for use during construction activities, but the impact of any such withdrawal and water use for construction of the Facility will be minimal. Construction water use is significantly less than

water use during plant operations. Sections 2.3 and 4.2 of the ER address water use.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON WASTE MANAGEMENT.

A. Construction activities generate solid waste. Debris from construction activities will be deposited in a permitted landfill or other permitted disposal facility. This may be an on-site construction and demolition landfill for which SCE&G receives a permit, or it may be another, offsite landfill located in the area. SCE&G will take reasonable steps to recycle scrap metal, aluminum, or other reasonably recyclable materials.

Q. PLEASE DESCRIBE THE ANTICIPATED IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON FISH AND WILDLIFE.

A. A survey was conducted to determine the presence of species listed on the threatened or endangered species list. No such wildlife was found on the site, nor was any listed fish species found in the Parr or Monticello Reservoirs.

There are two bald eagle's nests located approximately 1.7 and 1.8 miles away from the Facility on the reservoirs. The bald eagle is not listed on the Federal endangered species list, but is still protected under other federal

statutes such as the Bald and Golden Eagle Protection Act and is state-listed. However, the construction will not impact the eagles or their habitat.

As to loss of habitat for existing on-site wildlife communities, the approximately 500 acres of directly affected habitat at the site represents a small portion of the available undeveloped land in the vicinity. Hence, the construction-related impacts and temporary displacement of wildlife is expected to be minimal relative to wildlife populations in the vicinity. In short, the construction should have a minimal impact on fish and wildlife.

Impacts on fish and wildlife are expected to be small and are addressed in Section 4.3 of the Environmental Report.

Q. PLEASE DESCRIBE THE ANTICIPATED IMPACTS OF THE CONSTRUCTION OF THE PROPOSED FACILITY ON PLANTS.

Another component of the threatened and endangered species analysis is a determination of the presence of any listed plants on the site. None are present. The construction activities for the Facility will neither reduce the local diversity of plants or plant communities nor impact endangered or threatened species. Sections 2.4 and 4.3 of the ER address impacts to plants.

Q. PLEASE DESCRIBE OTHER ENVIRONMENTAL CONSIDERATIONS IN THE CONSTRUCTION OF THE PROPOSED FACILITY.

A. There are 21 properties within 10 miles of the site that appear on the National Register of Historic Places, although none of those sites is located on SCE&G property. However, a cultural resource survey revealed two onsite areas – a monument and a grave – that may be eligible for inclusion on the National Register. SCE&G has fenced these sites and neither will be impacted by the construction or operation of the Facility. Overall, the impacts from construction of the Facility on historical and cultural resources will be small.

One of the benefits of constructing the Facility on the site of an existing nuclear plant is that the site already has been determined to be acceptable from a geological and environmental perspective. Nevertheless, additional studies related to geological and seismological attributes were undertaken to ensure that the site still satisfies the location criteria. These additional studies have confirmed the original findings that the site is geologically and seismologically acceptable as a site for the Facility.

Another consideration was the increased traffic generated by the construction. The numbers of additional trucks and cars on the road will produce additional air emissions during the construction period, but only in minimal amounts. The greatest impact from traffic will be the additional traffic flow, which also may have indirect environmental consequences. SCE&G will develop and adopt mitigation measures, such as the implementation of a construction management traffic plan, to minimize any impact. SCE&G will coordinate and cooperate with the SCDOT to determine

the best approach to facilitate easing or elimination of traffic flow related issues. The traffic impact is discussed in the Environmental Report at Section 4.4.2.2.4.

Radiation exposure for construction workers due to the proximity to Unit 1 and to Unit 2 upon completion is well below the regulatory limits, as demonstrated in Tables 4.5-2 and 4.5-3 of the Environmental Report and which are also set forth below. In these tables, criteria for public exposures, which are more restrictive than for radiation workers, are used.

Table 4.5-2
Comparison with 10 CFR 20.1301 Criteria for Doses to Members of the Public

Criterion	Dose Limit	Estimated Dose (TEDE)
Annual dose (millirem)	100	1.1
Unrestricted area dose rate (millirem/hour)	2	0.00056

Table 4.5-3
Comparison with 40 CFR 190 Criteria for Doses to Members of the Public

	Annual Dose (millirem)	
Organ	Limit	Estimated
Total body	25	1.1
Thyroid	75	0.51
Other organ	25	0.97 (skin)

Q. IN YOUR OPINION, WILL THE CONSTRUCTION OF THE PROPOSED FACILITY CONFORM TO APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL LAWS?

A. Yes. One of the results of the ER is an understanding and awareness of the legal obligations that SCE&G must adhere to in the construction of the Facility. SCE&G has begun the permit application process and to my knowledge is complying with the legal requirements to acquire the necessary authorizations to conduct work. As to compliance with those permits and authorizations, the extensive preconstruction planning process is designed to ensure that SCE&G complies with all of the applicable environmental laws during the construction of the Facility. The Environmental Report reiterates that SCE&G is committed to complying with its obligations under applicable environmental laws.

Q. WHAT STEPS WILL SCE&G TAKE DURING THE CONSTRUCTION PHASE TO MONITOR ENVIRONMENTAL COMPLIANCE AND MINIMZE THE ENVIRONMENTAL CONSEQUENCES OF THE CONSTRUCTION OF THE FACILITY?

A. As described in the ER, a construction environmental controls plan will be implemented. That plan will contain descriptions of the environmental management controls that will be used on the site to assist in meeting the overall environmental management objectives for the project. The plan will facilitate compliance with applicable local, state, and federal ordinances, laws, and regulations intended to prevent or minimize the environmental effects of construction activities on air, water, and land and the public.

To put the plan into action, mandatory environmental awareness training will be required before construction personnel, including subcontractor employees, are allowed to work on-site. Periodic site environmental compliance reviews and coordination meetings between site project personnel will be conducted to discuss current and future construction work activities as they relate to maintaining environmental compliance, with regular inspections of construction activities being performed to confirm that site activities remain in compliance with all applicable environmental requirements. Over a dozen monitoring programs will be implemented during the construction activities. These are summarized in Table 6.7-1 of the Environmental Report.

Q. IN YOUR EXPERT OPINION, HOW WOULD YOU CHARACTERIZE THE ENVIRONMENTAL IMPACTS FROM THE CONSTRUCTION OF THE FACILITY?

A. Overall, employing the NRC protocol for assessing and ranking impacts, the construction impacts of the Facility on the environment are small. Based on the Environmental Report, the impact can be summarized in the following chart:

Category	**Environmental Impact**
Site and Vicinity	Small
Air Quality	Small
Water Quality	Small
Water Quantity and Use	Small
Terrestrial Ecosystems	Small
Aquatic Ecosystems	Small
Threatened and Endangered Species	Small
Historic and Cultural Resources	Small
Transportation	Moderate to Large

As previously explained, a "small" impact is defined as one for which the environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. The construction-related environmental impacts and mitigation measures are summarized in the Environmental Report at Table 10.1-1.

As previously discussed, the transportation impacts derive from increased traffic to the Facility and the widening of roads directly attributable to the construction of the Facility, and these will be addressed in a traffic management plan developed by SCE&G in conjunction with S.C. Department of Transportation.

Q. FROM AN ENVIRONMENTAL PERSPECTIVE, WHAT IMPACTS WILL RESULT FROM THE OPERATION OF THE FACILITY?

A. The impacts from the operation of the Facility are similar to the impacts of the operation of Unit 1 at the site. There will be few air emissions. SCE&G will discharge effluent pursuant to DHEC-issued permits into the Parr Reservoir, but will do so with little impact. The non-radioactive and radioactive solid waste will increase, and will be handled in the same general manner as the solid waste is treated at Unit 1. In sum, the operation of the Facility will increase by a proportionate amount, the minimal environmental impacts already present with the operation of Unit 1.

The Environmental Report contains a summary of the environmental impacts, mitigation measures (if the impact even warrants mitigation), and the resulting environmental consequence after the impact has been mitigated at Table 10.1-2.

Q. WHAT ENVIRONMENTAL PERMITS OR APPROVALS WILL BE REQUIRED TO OPERATE THE FACILITY?

A. To operate, the Facility requires a COL from the NRC. This comprehensive license will incorporate significant controls for radiological and non-radiological environmental emissions alike, as evidenced by the expected

inclusion of an environmental protection plan appended to the combined operating license.

Additionally, NRC and U.S. Department of Transportation approvals are necessary for the transportation and possession of nuclear materials. SCE&G will secure FERC approval to allow the withdrawal of water from Monticello Reservoir and construction of intake and discharge structures.

SCE&G also will need to acquire several state authorizations. These include revisions to existing permits, such as the wastewater discharge permit, the air operating permit, and the radioactive waste transport permit. Other requirements include registration and reporting of surface water withdrawal, obtaining authorization for stormwater discharges associated with industrial activity, and securing a radioactive materials license.

The authorizations and approvals generally required before the Facility can begin operating are listed in Table 1.2-4 of the Environmental Report.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE OPERATION OF THE PROPOSED FACILITY ON AIR QUALITY.

A. The air emissions from operation of the Facility will be negligible in comparison to other proven means of base load power generation. The Environmental Report sets forth a chart that provides a comparison of the air

emissions of criteria pollutants from other different methods of baseload generation.

Table 10.4-1
Avoided Air Pollutant Emissions

Pollutant	Coal Emissions (tons per year)[a]	Gas Emissions (tons per year)[a]	Nuclear Emissions (tons per year)[b]
Sulfur dioxide	7,044	34	0
Nitrogen oxides	1,495	558	0
Carbon monoxide	1,495	116	0
Carbon dioxide	16,500,000	5,630,000	0
Mercury	0.25	0	0
Particulates having a diameter of less than 10 microns	67	97	0
Particulates having a diameter of less than 2.5 microns	17	97	0

a) Based on constructing three units to replace the power produced by Units 2 and 3 (see Section 9.2).
b) Nuclear power plants have emergency and auxiliary equipment that is fossil-fuel-fired and emits pollutants. The equipment is generally operated only for testing purposes for less than 250 hours per year. As such, the emissions are considered de minimus and are excluded here.

Nuclear generation, such as the Facility, is clearly superior in terms of operations-related air emissions of criteria pollutants, greenhouse gases, and hazardous air pollutants.

The operation of the cooling towers will result in some particulate matter emissions, but generally speaking those emissions will not escape the property boundary. Other air emissions anticipated from the operation of the

Facility are those associated with any auxiliary equipment that will be located on-site, which is expected to operate less than 250 hours per year, and minimal radiological emissions from the nuclear plant. The non-radiological emissions qualify the equipment as minor air emissions sources which therefore have a *de minimis* impact on air quality. The radiological emissions are well below the "as low as reasonably achievable" goals established by the NRC, which is the most stringent goal established by the NRC. The air quality impacts from operation of the Facility are described in Sections 5.5.1.3 and 5.8.1.2 of the Environmental Report.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE OPERATION OF THE PROPOSED FACILITY ON WATER QUALITY.

A. The Facility will use water from the Monticello Reservoir for its cooling system and plant operations. A water treatment plant also will be located at the site. Wastewater discharges to Parr Reservoir will include cooling tower blowdown, permitted wastewater from auxiliary systems, sanitary wastewater, and stormwater runoff. The cooling tower blowdown is just cooling water that has been chemically treated, and therefore may contain residual traces of the treatment chemicals.

Discharges will be subject to permit limits designed to protect instream water quality standards. Both discharge permits and water quality standards

are issued by DHEC. Almost all of the wastewater will be discharged through a single discharge point into the Parr Reservoir. The discharge system is discussed in the Environmental Report in Section 5.3.2. There will be a small discharge from the water treatment plant back to the Monticello Reservoir, but the largest discharge of effluent will be to the Parr Reservoir.

While the effluent streams will be mixed, the majority of the effluent will be cooling tower blowdown. Because the blowdown stream will be very small relative to the flow of the Broad River, concentrations of solids and chemicals used in cooling tower water treatment will return to ambient levels almost immediately downstream of the discharge pipe.

The water quality impacts from operation of the Facility are described in Sections 5.2.3, 5.3.2, and 5.5.1.1 of the Environmental Report. In accordance with its permits, SCE&G will monitor and report the effluent discharge levels in support of its obligation to ensure that all applicable permit conditions are met.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS OF THE OPERATION OF THE PROPOSED FACILITY ON WATER QUANTITY.

A. Groundwater will not be withdrawn for operational use by Units 2 and 3. Instead, SCE&G will withdraw surface water. Of the total surface water withdrawn, water for makeup to the circulating water system will be supplied

at an approximate rate of 81 cfs during normal operations. Water for the water treatment plant will be withdrawn for Unit 2 and 3 uses at an approximate rate of 2.2 cfs during normal operations. Figure 5.2-1 of the Environmental Report provides a diagram of the water use at the Facility.

There will be some consumptive losses in the use of water. The loss of water is largely attributable to evaporation. Withdrawn water, less consumptive losses of approximately 62 cfs, is returned within the same general geographic area, as indicated on Figure 5.2-1. Importantly, water returned to the Parr Reservoir and the Broad River from the Facility is not lost to downstream users or downstream aquatic communities. Under normal flow conditions, these consumptive losses will be barely discernible on the Broad River flow.

FERC has imposed a minimum downstream flow rate which contributes to the protection of downstream uses that must be maintained, regardless of the use of water by the Facility. During low-flow periods, the FERC-designated flow rate will continue to flow downriver so long as that amount of flow is coming from upstream. If less than the minimum flow is coming downstream to Parr, then SCE&G's obligation is to pass what it receives from upstream, less evaporation. In that circumstance, SCE&G may continue to draw water from Monticello Reservoir to meet the nuclear station water needs without replenishing Monticello Reservoir with water from the Parr Reservoir. In this manner, the Monticello Reservoir will be drawn down and the river will

continue to flow downstream and meet the flow rates mandated by FERC. Therefore, even under low-flow conditions, downstream users will still enjoy water use based on the federally mandated requirements and the Facility may continue to generate power.

In other words, the water consumption situation presented at the V.C. Summer Nuclear Station site is ameliorated by the presence of the Monticello Reservoir. This reservoir provides SCE&G the capability of operating the facility without impacting the downstream flow of the Broad River. In fact, SCE&G theoretically could operate all three nuclear units for approximately two and one-half (2½) months at full capacity, relying only on the resources offered by the Monticello Reservoir, thereby avoiding any adverse downstream flow impacts.

The water use and consumption from operation of the Facility are described in Section 5.2.2 of the Environmental Report.

Q. PLEASE DESCRIBE THE ANTICIPATED IMPACTS OF THE OPERATION OF THE PROPOSED FACILITY ON FISH AND WILDLIFE.

A. The intake system for Units 2 and 3 is designed to mitigate impacts on fish and aquatic life, utilizing intake velocities that protect fish and shellfish. Using conservative estimates plus data from impingement and entrainment of

fish for the Unit 1 intake, the evidence is clear that the impact of impingement by the intake system is small.

Another potential impact on fish and aquatic life in the Parr Reservoir could be from the discharge of heated effluent. When evaluated, however, only a very small portion of the Parr Reservoir in the immediate area of the discharge structure will be affected. With the relatively small thermal plume, most of the reservoir will remain unaffected and the plume will not create a barrier to upstream or downstream movement of fish. This means the impacts will be small.

The impact of operations on wildlife similarly will be small. For example, the cooling towers' noise is below the level that would startle or frighten wildlife, and the closest natural habitat will be over 600 feet away. In short, the operation of the Facility should not adversely impact wildlife to any significant extent.

Q. PLEASE DESCRIBE THE ANTICIPATED ENVIRONMENTAL IMPACTS AND EFFECTS OF NON-RADIOACTIVE SOLID WASTE CREATED BY THE OPERATION OF THE PROPOSED FACILITY.

A. The operation of two additional reactors will increase the non-radioactive solid waste volume. SCE&G anticipates an additional 800 personnel are needed to operate the Facility. The presence of these additional workers as well as the additional operations generally will add to the current

solid waste volume. However, the characteristics of the wastestreams will not change from Unit 1. This fact allows the current Unit 1 practices to be adapted to the new units as well. SCE&G's existing waste minimization plan for Unit 1 will be expanded to include Units 2 and 3, and the waste management practices utilized for Unit 1 will also govern Units 2 and 3.

The non-radioactive solid waste impacts from operation of the Facility are described in Section 5.5.1.2 of the Environmental Report.

Q. HOW WILL RADIOACTIVE WASTE BE HANDLED AND DISPOSED OF?

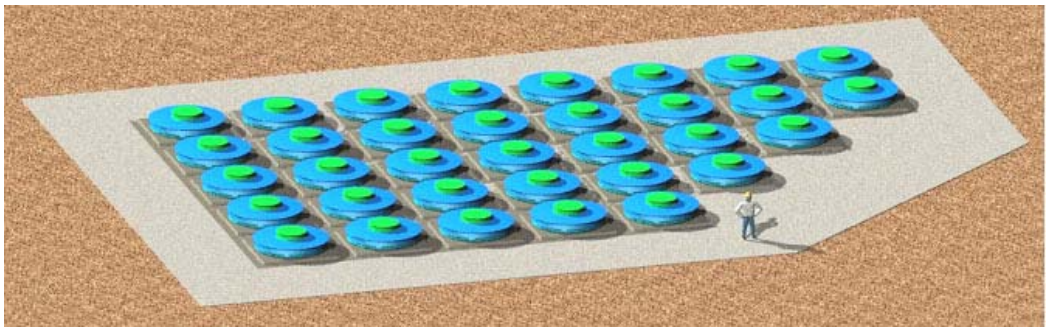
A. The operations of the Facility will generate low-level radioactive waste and spent nuclear fuel (SNF). Generally, the procedures and disposal methods that are currently utilized for the radioactive waste disposal of Unit 1 will also be utilized for Units 2 and 3. Those radioactive waste management practices are discussed in the Environmental Report in Section 3.5.

Low-level radioactive waste is stored on-site on an interim basis before being shipped to a permanent disposal facility. SCE&G has contracts with two such permanent disposal sites – one in Erwin, Tennessee, and one in Barnwell, South Carolina.

The Facility operations should not result in any high-level or transuranic radioactive wastes. However, should any be created, the waste and the spent fuel will be disposed of by the U.S. Department of Energy, which is obligated

to assume responsibility. Initially, such wastes will be held on-site. Spent fuel rods will be kept in spent fuel pools pursuant to NRC regulations and guidelines. Below is a picture of the spent fuel pool at Unit 1:

Once removed from the spent fuel pool, SNF may be stored in dry fuel storage. A below-ground on-site dry fuel storage facility is diagramed below for illustrative purposes:



SCE&G is considering use of either below or above ground dry fuel storage. Spent fuel pools and dry fuel storage provide safe mechanisms for the virtually indefinite storage of this waste, if necessary. The Environmental Report

discusses the disposal of low-level radioactive waste and SNF in Sections 5.5.4 and 5.7.

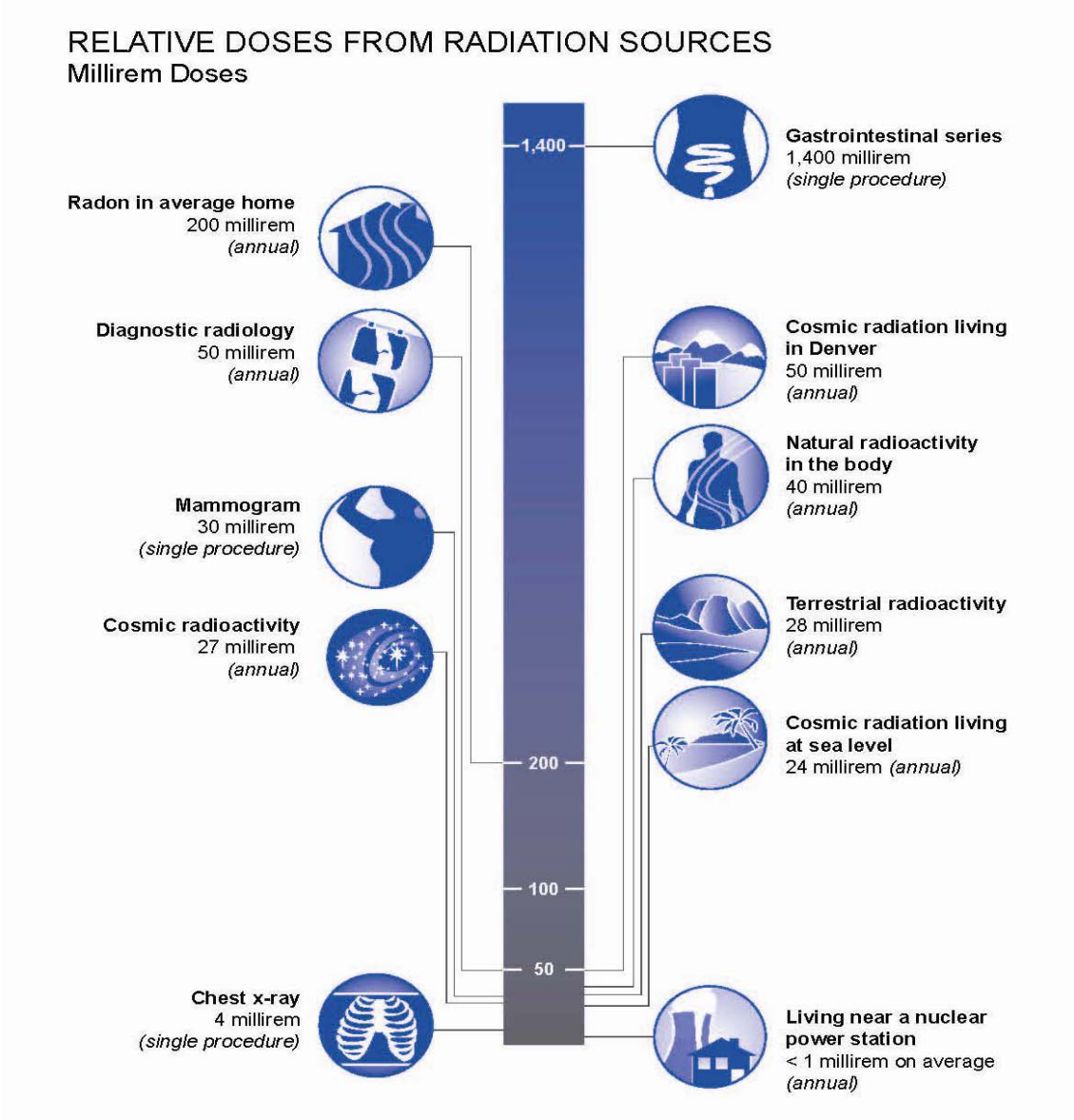
The transportation of the radioactive wastes is subject to stringent controls on moving radioactive wastes from one location to another and incident-free transportation is the goal. This goal has been achieved, as there has been no release of any radioactive material from the transportation of SCE&G Unit 1's low-level radioactive waste. The Environmental Report discusses the practices and procedures in detail in Section 5.11.

Q. HOW WILL RADIATION FROM THE FACILITY IMPACT PUBLIC HEALTH AND THE ENVIRONMENT?

A. In my experience, and based on the scientific literature the impact of radiation to public health and the environment from the operations of nuclear power plants is significantly lower than what people may be exposed to in their everyday lives. The scientific literature overwhelmingly supports the conclusion that there is no causative association between proximity to nuclear power plants and increases in cancer rates. A copy of two peer-reviewed scientific studies demonstrating that there is no causal link between cancer and proximity to a nuclear plant are attached as **Exhibit No.__ (SJC-4)** to my testimony.

Given the safety record and results of radiological monitoring reports for Unit 1, there is no reason to believe that a different conclusion would be

warranted in this case. In May 2007, EPA published a document entitled "Radiation: Risks and Realities," which is attached to my testimony as **Exhibit No.__ (SJC-5)**. The EPA discusses the background levels of naturally occurring radiation and various levels of exposure from different activities. For example, the EPA created a graphic that aptly demonstrates the minimal contribution of nuclear power plants, a copy of which is set forth below.



This graphic shows, from a radiation exposure perspective, that an individual accumulates less additional radiation from living near a nuclear facility for fifty years than an individual does living in Denver for just one year. This is because Denver is at a higher altitude and thus closer to the cosmic radiation. Individuals receive an increased exposure from taking a commercial airline flight due simply to the high altitude. The EPA concluded that "[n]uclear power plant operations account for less than one-hundredth (1/100) of a percent of the average American's total radiation exposure."

SCE&G has submitted reports to the NRC which give serious consideration to the issue of radiation exposure. The analyses and considerations include the different pathways of radiation exposure, such as direct, airborne, waterborne, aquatic, and ingested. The exposures all fall well within the regulatory limits, as demonstrated by Tables 5.4-7 and 5.4-8 of the Environmental Report, set forth below.

Table 5.4-7
Comparison of Annual Doses with 10 CFR 50, Appendix I Criteria

Type of Dose	Location	Annual Dose	
		Unit 2 or 3	Limit
Liquid effluent[a]			
Total body (millirem)	Parr Reservoir	0.051	3
Maximum organ – liver (millirem)	Parr Reservoir	0.17	10
Gaseous effluent[b]			
Gamma air (millirad)	Site boundary	0.58	10
Beta air (millirad)	Site boundary	2.4	20
Total external body (millirem)	Site boundary	0.55	5
Skin (millirem)	Site boundary	2.0	15
Iodines and particulates[c] (gaseous effluents)			
Maximum organ – thyroid (millirem)	1.23 miles, E	9.0[d]	15

a) Total body dose is for an adult using the Parr Reservoir. The liver dose is for a child using the Parr Reservoir.
b) Northeast Site Boundary. Ground Level releases assumed.
c) Includes Tritium and Carbon-14 Terrestrial food chain dose (and inhalation dose for calculation ease and conservatism), consistent with Table 1 of Regulatory Guide 1.109.
d) Infant drinking home-produced goat milk. Difference between Tables 5.4-7 and 5.4-8 thyroid dose is 0.07 millirem (from each unit) from noble gases in the plume.

Table 5.4-8
Comparison of Maximally Exposed Individual Doses with 40 CFR 190 Criteria (millirem per year)

	Units 2 and 3			Unit 1[c]	Site Total	Regulatory Limit
	Liquid	Gaseous	Total	Total		
Total body[a]	0.10	0.91	1.0	1.2	2.2	25
Thyroid[b]	0.14	18.2[c]	18.3	0.04	18.4	75
Other organ - bone[a]	0.082[d]	3.84	3.9	0.04	4.0	25

a) Residence with garden, dose to child, 1.23 miles E of new units.
b) Residence with goat, infant drinking goat milk, 1.23 miles E of new units.
c) At location of new units maximally exposed individual.
d) Maximum other organ doses for liquid pathway is 0.34 mrem/yr to the GI-LLI. (two new units)

In my expert opinion, reasonable and prudent steps are being taken in the design and construction of the Facility to minimize radiation exposure to a negligible level. The radiological impacts of operation of the Facility are

examined in the Environmental Report in Section 5.4, and the radiological monitoring program is discussed in Section 6.2.

Q. WHAT STEPS WILL SCE&G TAKE DURING THE OPERATING PHASE TO MONITOR ENVIRONMENTAL COMPLIANCE AND MINIMZE THE ENVIRONMENTAL CONSEQUENCES OF THE OPERATION OF THE FACILITY?

A. The operations of the Facility must be conducted in accordance with the limitations and specifications of numerous licenses and permits. Those licenses and permits carry extensive monitoring and reporting requirements and SCE&G's compliance will assure that the environmental impacts of operating the units will be small.

In support of the operations at the Facility, SCE&G will be responsible for conducting thermal, non-radiological, radiological, hydrological, meteorological, chemical, air, and water quality monitoring programs to ensure that the operations of the facility continue to comply with all environmental permits, licenses, and regulations.

For example, the wastewater discharge permits issued by DHEC carry certain monitoring and reporting requirements, as do the air quality and solid waste permits. SCE&G will be responsible for providing DHEC with periodic monitoring reports in the same general manner as it currently does for Unit 1. Additionally, the NRC has stringent requirements for the monitoring and

reporting which must be complied with. Overall, the operations of the Facility will be subjected to significant monitoring and reporting requirements by federal and state agencies as well as significant direct government oversight.

Q. WILL THE OPERATION OF THE PROPOSED FACILITY CONFORM TO APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL AND LAND USE LAWS?

A. The operations of Units 2 and 3 will be designed to meet the environmental law requirements.

Q. IN YOUR EXPERT OPINION, HOW WOULD YOU CHARACTERIZE THE ENVIRONMENTAL IMPACTS FROM THE OPERATION OF THE FACILITY?

A. Overall, the operating impacts of the Facility on the environment are small. Based on the Environmental Report, the impact can be summarized according to the aforementioned NRC ranking protocol for environmental impacts in the following chart:

Category	**Environmental Impact**
Site and Vicinity	Small
Air Quality	Small
Water Quality	Small
Water Quantity and Use	Small
Terrestrial Ecosystems	Small
Aquatic Ecosystems	Small
Threatened and Endangered Species	Small
Historic and Cultural Resources	Small
Transportation	Small to Moderate

As previously explained, a "small" impact is defined as one for which the environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. Notably, the transportation impacts decrease during operations when compared to the construction phase. The impact during operation of the Facility is only small to moderate, rather than moderate to large. The operation-related environmental impacts and mitigation measures are summarized in the Environmental Report at Table 10.1-2.

Q. WERE ALTERNATIVES TO THE PROPOSED FACILITY CONSIDERED? IF SO, WHAT WERE THOSE ALTERNATIVES, AND WHY IS THE FACILITY SUPERIOR TO THOSE ALTERNATIVES?

A. Yes, alternatives were considered.

As other Company witnesses testified, electric customers in South Carolina have a need for additional base load capacity. Alternative considerations not involving new capacity include (1) the purchase of power from other sources; (2) extending the life of existing plants; or (3) relying on demand-side management programs. Each is discussed in the Environmental Report at Section 9.2.1.

Both purchased power and extending the life of existing plants means emissions from other fossil-fuel sources such as coal and natural gas. As I will discuss, these alternative means of generation are more environmentally costly than nuclear generation. As to demand-side management (DSM) programs, SCE&G will continue its DSM efforts, but the reality is that the DSM savings are insufficient to offset projected growth. Therefore, according to its studies, as more fully discussed by Dr. Joseph Lynch and other Company witnesses, SCE&G has documented its conclusion that the most feasible alternative by which it can meet its need for base load power is for SCE&G to build base load generation.

Certain generation sources simply cannot realistically generate enough power to meet the needs of SCE&G. For example, biomass and geothermal

cannot be effectively utilized in South Carolina on the scale necessary to meet significant base load power needs. Similarly, there are no reasonable sites for additional significant hydroelectric generation.

Base load generation requires a consistent and reliable source of power. Wind and solar power provide neither. Also, both sources are expensive and consume vast acreages, which is environmentally detrimental, even discounting the need for transmission corridors associated with these alternatives.

Coal and natural gas each offer proven alternatives to meet the power production requirements, but both produce environmental consequences and impacts greater than those found with nuclear power. The Environmental Report provides a comparison of the environmental impacts in Table 9.2-4. However, illustrative of the difference is air emissions. As previously noted, the nuclear power option provides a significant advantage over the alternatives of coal or natural gas, as Table 10.4-1 of the ER illustrates.

In an evaluation of the various impacts, the nuclear power option was the only one that had small impacts for all categories of direct environmental impacts, as reflected in the analysis in the Environmental Report and summarized in the following table.

Table 9.2-3
Impacts Comparison Summary

Impact Category	Proposed Action (VCSNS COL)	Coal-Fired Generation	Gas-Fired Generation
Land Use	SMALL	SMALL	SMALL
Water Quality	SMALL	SMALL	SMALL
Air Quality	SMALL	MODERATE	MODERATE
Ecological Resources	SMALL	SMALL	SMALL
Threatened or Endangered Species	SMALL	SMALL	SMALL
Human Health	SMALL	MODERATE	SMALL
Socioeconomics	SMALL	SMALL	SMALL
Waste Management	SMALL	MODERATE	SMALL
Aesthetics	SMALL	SMALL	SMALL
Cultural Resources	SMALL	SMALL	SMALL
Accidents	SMALL	SMALL	SMALL

In consideration of the state of available technology and the nature of the alternatives, it is clear that the nuclear power option is the best of the available alternatives from an environmental perspective to meet the baseload generating needs of SCE&G.

SCE&G's evaluation of alternative sites focused on whether there are any sites that are superior to the site location of the operating nuclear plant at V.C. Summer Nuclear Station. The review process was consistent with NRC methodology. Initially, candidate sites included a federal facility, SCE&G-owned property, and greenfield sites within the region of interest. In the course of its initial review, SCE&G determined that the advantages of co-locating the new facility with an existing power facility outweighed the advantages of any other probable siting alternative. Thus, concentrated consideration of alternative sites within the region of interest focused primarily on sites with existing power facilities.

The Environmental Report contains a detailed evaluation of the environmental impacts associated with locating the Facility at the V.C. Summer Nuclear Station site in Section 9.3.3.

For many reasons, but especially because it is the site for a currently operating nuclear power plant, the V.C. Summer Nuclear Station site presents an obvious choice as a viable location for the Facility from an environmental standpoint.

Q. WHAT WAS THE CONCLUSION OF THE ENVIRONMENTAL REPORT AND SUPPORTING STUDIES AND DOCUMENTS THAT WERE CONDUCTED FOR THIS PROJECT?

A. In my testimony I have summarized the key findings of the Environmental Report. The evaluation, analysis, and study of the environmental impacts from the construction and operation of Units 2 and 3 have been comprehensive and thorough and comport with the requirements of environmental laws. Based upon this comprehensive evaluation, analysis, and study of the V.C. Summer Nuclear Station site as reflected in the ER, it is my expert opinion that the environmental impacts of construction and operation of the Facility will be small and well within the applicable parameters established by environmental laws.

Moreover, my confidence that the V.C. Summer Site is an excellent and safe site upon which to build Units 2 and 3 from an environmental perspective

is enhanced and bolstered by the Company's experience in successfully operating Unit 1 on this site for over 26 years with minimal environmental impact.

Consequently, in my expert opinion, from an environmental standpoint I recommend the V.C. Summer Site to the Commission as an appropriate and reasonable site upon which to build and operate Units 2 and 3.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes.